

Team: APTIV

Aptiv PLC (NYSE: APTV) is a technology company that is transforming mobility with its portfolio of safe, green, and connected solutions for a diverse array of global customers. Aptiv will usher in the next generation of active safety, autonomous vehicles, smart cities, and connectivity by creating smart mobility solutions with a strategically focused data & power, central computing, and connected services portfolio. Aptiv addresses key mobility challenges through industry-leading software capabilities, software and systems architecture integration, and compute platforms that unlock next generation features - now. Headquartered in Gillingham, England, Aptiv has 147,000 employees and operates 14 technical centers, as well as manufacturing sites and customer support centers, in 45 countries.

Title: Bluetooth 5.0 features in Automotive**Description:**

Bluetooth 5.0 technology is an outgrowth of Bluetooth 4.2 technology. Ratification of the BT5.0 Core Specification is in process; some IC companies are providing BT5.0-compliant hardware in anticipation of the BT5.0 standard adoption.

Certain features attractive for Automotive use-cases apply to both BT4.2 and BT5.0 standards, and can be developed in a progressive fashion. Both technologies emphasize “Bluetooth Low Energy” (BLE) features, enabling stand-alone or battery-powered small transceivers capable of up to 1Mbit/sec instantaneous throughputs.

Special Automotive use-cases of BLE will include: Interfaces between passenger “wearable” devices and the Automotive Infotainment system, on-vehicle sensors implemented wirelessly (e.g., tire pressure, seat belt usage monitors, etc.), and remote-interface schemes such as key-fobs or smart-phone remote applications.

Particular challenges to address in Automotive BLE use-cases will include: Existing and/or enhanced security verifications (particularly in key-fob type use-cases), maximization of wireless link/distance range (includes transceiver RF optimizations as well as enhanced-range coding features in the newer BT5.0 protocol), efficient identification of transceiver Locations (may include multi-antenna features proposed for BT5.0), and management of long-term current consumption (for battery life).

Some proposed Automotive BLE use-cases may initially be developed in generic BT LE “GATT” profiles; later there may be standardized new Profiles similar to today’s HFP (hands-free-phone) BT profile.

Development activities/roles will include:

- Aptiv will procure BT4.2/BT5.0 evaluation boards and provide 2 to MSU.
- MSU to perform theoretical research on BT5.0 and define scope of features to be deployed in a vehicle environment.
- MSU to develop a prototype system capable of performing the top 2 features.
- Aptiv to receive and install the prototype system in a vehicle and evaluate the results of MSU study.

Technologies:

- Bluetooth 4.2
- Bluetooth 5.0
- 2.4GHz antennas

Suggested Resources:

- www.bluetooth.com
- www.ti.com/product/CC2640R2F

Client Contact Information:**Instructor Contact(s): (main point of contact for the instructor)****Linh Pham**

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Student Team Contact(s)

The main points of contact for the student team, serving as the student team's main clients and mentors.

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Other Contacts(s)

Other people within Aptiv who would like to be informed through an occasional email (a few per semester) about the progress of the capstone project and course.

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